IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
COLUMBIA DIVISION

IN RE SAFETY-KLEEN CORP. BONDHOLDERS LITIGATION	Consol. Case No. 3-00-1145 17

PLAINTIFFS' TENTH MOTION IN LIMINE
(TO PRECLUDE THE TESTIMONY OF SURESH SUNDARASEN,
PRICEWATERHOUSECOOPERS LLP'S MARKET EFFICIENCY EXPERT)

Lead Plaintiffs American High Income Trust and State Street Research Income Trust ("Plaintiffs") hereby file this motion in limine, to preclude defendant PricewaterhouseCoopers LLP ("PwC") from introducing at trial any testimony by their purported market efficiency expert, Suresh Sundarasen ("Sundaresan"). The grounds for this motion are that Sundaresan's opinions are irrelevant and fail to present any helpful information to a jury, as set forth more fully below:

1. Plaintiffs have sued PwC under Section 10(b) of the Securities Exchange Act of 1934, among other claims. Reliance is an element of a Section 10(b) claim. Plaintiffs maintain that Safety Kleen's 2008 Bonds and 2009 Bonds (the "Bonds") traded in an efficient market and therefore, under *Basic Inc. v. Levinson*, 485 U.S. 224, 247 (1988), reliance may be presumed. In *Basic*, the Supreme Court held that "[a]n investor who buys or sells stock at the price set by the market does so in reliance on the integrity of that price. Because most publicly available information is reflected in market price, an investor's reliance on any public material misrepresentations, therefore, may be presumed for purposes of a Rule 10b-5 action." 485 U.S. at 247. This is referred to as "fraud-on-the-market," which the Supreme Court explained "is based on the hypothesis that, in an open and developed securities market, the price of a company's stock is determined by the available material information regarding the company and

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its business... Misleading statements will therefore defraud purchasers of stock even if the purchasers do not directly rely on the misstatements...." *Id.* at 241-242.

2. In cases following i, the courts have noted that "[t]he central question under the fraud on the market theory is whether the stock price, at the time a plaintiff effected a trade, reflected the 'misinformation' alleged to have been disseminated." *Simpson v. Specialty Retail Concepts*, 823 F. Supp. 353, 354 (M.D.N.C. 1993) (quoting *Cammer v. Bloom,* 711 F. Supp. 1264, 1282 (D.N.J. 1989)). *See also Gariety v. Grant Thornton LLP*, 368 F.3d 356, 367 (4th Cir. 2004)"[t]he central premise of the fraud on the market theory is that prices of actively traded securities reflect publicly available information."). As long as the security's prices reflected all publicly available information at the time of the transactions, reliance may be presumed. *See In re Burlington Coat Factory Sec. Litig.*, 114 F.3d 1410, 1425 (3d Cir. 1997) ("efficient markets are those in which information important to reasonable investors ... is immediately incorporated into stock prices"); *In re Resource Am. Sec. Litig.*, 202 F.R.D. 177, 189 (E.D. Pa. 2001) ("An efficient market is one in which prices reflect available information."); *Cromer Finance Ltd. v. Berger*, 205 F.R.D. 113, 130 (S.D.N.Y. 2001) ("The principles supporting the application of a rebuttable presumption in *Basic* ... are not that the market need be 'open' and 'developed' per se, but that those features are typical of markets where share price 'reflects all publicly available information, and, hence, any material misrepresentations.'") (quoting *Basic*, 485 U.S. at 246); *Hurley v. FDIC*, 719 F. Supp. 27, 33 (D. Mass. 1989) ("The important question is whether the stock is traded in a market that is efficient--one that obtains material information about a company and accurately reflects that information in the price of the stock.").

3. PwC has proffered Professor Sundaresan, who PwC claims is an expert in

corporate bond markets,[1] to testify on (1) the nature of the market for the Bonds and (2) the "lack of efficiency" of that market. As explained more fully below, Professor Sundaresan's Report focuses primarily on opinions about relative efficiencies of fixed income securities markets in general. Those opinions will not assist the jury in deciding whether the market for *the Bonds at issue in this case* was efficient and will needlessly waste time. Further, the indicia of market efficiency that he discusses are far afield from those that courts have found relevant in deciding whether the "fraud-on-the-market" rule applies in a Section 10(b) case.

4. Approximately 75% of Professor Sundaresan's Report is spent discussing the following three wholly irrelevant opinions:

a. That the *most* liquid bond market is the United States Treasury market followed by the agency debt securities market;

b. That the absence of certain market institutions in the high yield bond markets render them structurally *vulnerable* to market inefficiency; and

c. That most empirical measures of market efficiency demonstrate that high yield bond markets are *less efficient* than the Treasury and agency debt markets.

Report at 2. These opinions amount to nothing more than Professor Sundaresan's observations about the *relative* efficiencies, *generally* speaking, among various bond markets. (Report at 6-11). Such opinions are irrelevant and will not help the jury in deciding whether the market for *the Safety Kleen Bonds* was efficient during the Class Period. Numerous courts have held that where a security trades, or what type of security it is, is not dispositive when evaluating market

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[1] Professor Sundaresan issued a report on September 2, 2003 and was deposed on October 17, 2003. Relevant portions of his deposition testimony are annexed hereto as Exhibit A. After his deposition was completed and expert discovery had closed, Professor Sundaresan issued a revised report dated November 2, 2003 (the "Report"). A copy of the Report is annexed as Exhibit B.

efficiency. *See, e.g.,Harman v. LyphoMed, Inc.*, 122 F.R.D. 522 (N.D. Ill. 1988) ("While some over-the-counter stocks no doubt trade in a less developed market than some New York Stock Exchange issues, the inquiry in an individual case remains the development of the market for that stock, and not the location where the stock trades."); *Hurley*, 719 F. Supp. at 33 (same); *Cammer*, 711 F. Supp. at 1281 ("It would be illogical to apply a presumption of reliance merely because a security is traded within a certain 'whole market,' without considering the trading characteristics of the individual stock itself.").

5. Moreover, there are many different definitions of the term "market efficiency," most of which are irrelevant to application of the "fraud-on-the-market" rule. Professor Sundaresan admits that he is using the term "efficiency" as a term of art as it is used and understood by economists and other professionals and participants in the finance industry. In fact, Professor Sundaresan selected and chose for analysis only the following elements of "efficiencies," as that term is used in his field:

a. Whether corporate bond and high yield bond market participants have access to an active market in repurchase agreements and Single Name Credit Default swaps;

b. The use of indicative rather than live prices

c. The frequency of trading;

d. The size of bid-ask spreads; and

e. The fact that high-yield bonds vary "significantly" in terms of issue size, credit exposure and contractual terms.

Report at 4-11. Professor Sundaresan's definition of "efficiency," and his indicia thereof, are <u>not</u> the definition and indicia that are relevant for purposes of the federal securities laws. Rather, the critical issue for purposes of this case -- and one which Professor Sundaresan never even

considered -- is whether the prices at which the securities traded reflected all publicly available information.

6. To be admissible, expert testimony must not only be relevant, but must "assist the trier of fact to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702. "Expert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful." *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591 (1993) (citation omitted). Under these standards, Professor Sundaresan's proffered testimony regarding the debt securities markets in general should be excluded, as it is irrelevant to any issue in the case and would not be helpful to the jury.

7. It is not until the last quarter of his Report that Professor Sundaresan attempts to apply his general academic findings about relative efficiencies of various debt securities markets to the individual Bonds at issue in this case. (Report at 12-16). Specifically, he opines that the trade data he saw on the Bonds (which he acknowledged was not complete data), indicated to him that the Bonds traded in markets that were inefficient. (Report at 2, 12). However, his entire opinion on that issue is apparently premised on lack of liquidity in the market for the Bonds. He opines that the Bonds traded infrequently or "rarely" *relative to* the frequency of trades reported for the Treasury markets. (Report at 13). He also made *estimates* of bid-offer spreads for the Bonds based on the limited data that he had, from which he concluded there were very wide spreads which, *when compared with Treasury data*, "confirms" the "extreme" lack of liquidity in the Bonds. (Report at 13, 15-16).

8. In his deposition, Sundaresan testified, in essence, that he used liquidity as a litmus test for his determination of market efficiency. *See* Sundaresan Dep. at 298:22-300:4.

Specifically, he testified that it "would be very hard to visualize an illiquid market that is efficient." *Id.* at 299:14-16. However, liquidity is *not* a litmus test for market efficiency under the fraud-on-the-market rule. *See Gariety*, 368 F.3d at 368 (reference in *Basic* to the "modern securities markets, literally involving millions of shares changing hands daily" is "obviously a general statement offered as a contrast to face-to-face transactions and is not meant as a necessary requirement for finding that a market is efficient"). Instead, the courts treat liquidity as one of a number of factors that may be indicative of, but not determinative of, market efficiency. Those factors include: (1) the number of institutional investors in the security; (2) trading volume; (3) the number of securities analysts who follow and report on the company's securities; (4) the number of market makers for the security; (5) the company's entitlement to file an S-3 Registration Statement in connection with its public offerings; and (6) empirical facts showing a "cause and effect relationship between unexpected corporate events or financial releases and an immediate response in the stock price." *Cammer*, 711 F. Supp. at 1286-87. *See Gariety*, 368 F.3d at 368; *Simpson*, 823 F. Supp. at 354-355. The last of these factors -- a causal relationship between news events and changes in securities prices -- has been called "the most significant factor in determining market efficiency as it is 'the essence of an efficient market and the foundation for the fraud on the market theory.'" *In re 2TheMart.Com, Inc. Sec. Litig.*, 114 F. Supp. 2d 955, 964 (C.D. Cal. 2000).

9. Thus, Sundaresan's opinion regarding market efficiency for the Bonds goes merely to the purported non-existence of one factor -- and a non-necessary factor at that -- from a list of factors that will support a finding of market efficiency. Moreover, his analysis of that factor -- liquidity -- is flawed and reflects a fundamental misapprehension about the relevant

definition of "market efficiency" under the federal securities laws. Professor Sundaresan observed days when the Bond prices did not change at all, and opined that this was indicative of inefficiency. (Report at 13-15). But, that fact does *not* indicate market inefficiency. If the first buy or sale transaction does not occur until a week after a news event, but occurs at a price that incorporates the impact of that news event, the market is still efficient for purposes of the fraud-on-the-market rule. *See Cammer*, 711 F. Supp. at 1282 ("[t]he central question under the fraud on the market theory is whether the stock price, *at the time a plaintiff effected a trade*, reflected the 'misinformation' alleged to have been disseminated" (emphasis in original)).

10. Indeed, the litmus test for market efficiency under the fraud-on-the-market rule is not liquidity, but whether the securities prices reflect all available public information. However, Professor Sundaresan gave no consideration to whether or to what extent information issued during the Class Period impacted the actual trading prices of the Bonds, nor did he analyze the nature of the public announcements prior to March 2000 and whether they were such that they would have been expected to cause any significant changes in the Bonds' prices. He also did not analyze the severe drop in the Bonds' prices that occurred following the accounting-related disclosures in early March 2000, or assess the significance of that drop in light of the fraud-on-the-market rule. He did not examine a single Bond purchase or sale transaction to determine if the market price at which the transactions took place reflected all publicly available information, nor has he expressed any opinion on that critical question.

11. In sum, Professor Sundaresan's testimony is wholly irrelevant to the issue of whether reliance on the market for the Bonds can be presumed, and his testimony will not assist the jury in determining the relevant fact in this case – whether the market for the specific Bonds

at issue in this case was "efficient" for purposes of the fraud-on-the-market rule. Therefore, it should be precluded under *Daubert* and Rule 702 of the Federal Rules of Evidence.

WHEREFORE, Plaintiffs respectfully request that the Court grant their motion in limine, and enter an order precluding the testimony of Suresh Sundaresan at trial.

Dated: June 30, 2004

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EXHIBIT A

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA

Judge Joseph F. Anderson, Jr.

CONSOLIDATED CASE NO. 3:00-1145-17
IN RE: SAFETY-KLEEN CORP.
BONDHOLDERS LITIGATION

VIDEO DEPOSITION OF
SURESH SUNDARESAN
October 17th, 2003

REPORTED BY: Kelly George
Registered Professional
Reporter and Notary Public

twenty cents to do a trade, so, you know, if you look at a market such as Treasury market, the implied bid-offer spread which I report is less than half a basis point. It means that's a pretty low transaction cost, highly liquid market.
Q. Now, is liquidity a component of market efficiency?
A. It's an important component.
Q. Okay.
A. Yeah.
Q. But they're not synonymous. You don't use them interchangeably.
A. I have seen them --
Q. I'm asking you --
A. -- in academic papers, you know, used interchangeably. Again, we are running into the same issue of corporate bonds versus high yield bonds, and I think, you know, it depends on the context in which it is used.
Q. Okay. Well, you, in this report, are you using liquidity and

efficiency synonymously?
A. Yes.
Q. Okay. Now, and how could you -- I guess you could do that for purposes of this report, but you just said that liquidity and -- liquidity is an important component of efficiency.
A. There are other components I consider as well in the report.
Q. So then just maybe it's just language here, but how could they be synonymous if one is a component of the other?
A. It would be very hard to visualize an illiquid market that is efficient. So when I look at a market that is efficient, typically that market would be liquid as well. I can't think of an example to the contrary, so in that sense, they are synonymous.
But when we think about efficiency of the market, we do talk about, you know, how rapidly information

gets incorporated into the prices of the securities. Okay? That's sort of the discussion that may not occur when people talk about liquidity of the market.
Q. Okay. If we can look at your first full sentence under the empirical dimensions of market efficiency --
A. Right.
Q. You say the empirical -- I'm sorry, pardon me. The extent of the informational efficiency of a bond market is reflected by a number of important empirical dimensions of the bond market.
A. Uh-huh.
Q. Again, in this case, which bond market are you referring to?
A. I'm -- in this particular section, I'm comparing Treasury, agency, and high yield markets.
Q. Okay. And where does it say that, well, in this report? Where -- how can a reader know that?
A. If you look at Page 2.

Q. Okay.
A. In Section 3 of my report, I provide a framework and guidelines to assess the efficiency of fixed income markets in general and provide a comparison of corporate bond markets and Treasury bond markets.
Q. Okay. Again, we're using the term "corporate bond markets."
A. Yes.
Q. Okay.
A. I believe when we went over that, we made that correction.
Q. So one has to have learned that you meant by that corporate bond markets actually equals or means only high yield markets; is that right?
A. In the context of --
Q. Yes.
A. -- the evidence that I'm presenting, I'm only presenting evidence for high yield.
Q. Okay. And so that we would

EXHIBIT B

Expert Report of Suresh M. Sundaresan[1]

Revised November 2, 2003

Confidential

UNITED STATES DISTRICT COURT
RE: SAFETY-KLEEN CORPORATION BONDHOLDERS LITIGATION

[1] Chase Manhattan Bank Professor of Finance and Economics, Columbia Business School, 811 Uris Hall, 3022 Broadway, New York City, NY 10027. I can be reached by telephone at (212) 854 4423 or by email at ms122@columbia.edu.

1. Background:

I, Suresh M. Sundaresan, have been retained to serve as an expert by Gibson, Dunn and Crutcher LLP to form an opinion regarding whether the secondary market for certain debt securities was efficient. My report focuses on issues pertaining to the efficiency and transparency of high yield bond markets in the United States as they relate to this case. In this context I have examined the following issues and provided my opinions on them:

- How well do high yield bond markets compare with Treasury and agency markets in the context of price transparency and efficiency?
- What are the structural problems in the high yield bond markets that impede market efficiency?
- What are the empirical dimensions of market efficiency? How do high yield debt markets compare to the Treasury and agency debt markets?
- What are the bid-ask spreads and implicit and explicit trading costs in high yield bond markets in general?

I PROVIDE BELOW A SUMMARY OF MY OPINIONS

- The most liquid bond market is the United States Treasury market followed by the agency debt securities market.[2]
- The absence of certain market institutions in the high yield markets render them structurally vulnerable to market inefficiency.
- Most empirical measures of market efficiency demonstrate that high yield bond markets are less efficient than the Treasury and agency markets.
- Analysis of data on Safety-Kleen debt issues indicates that these securities trade in markets that are inefficient.

The rest of the report is organized as follows. Section 2 outlines my qualifications. In section 3 of my report, I provide a framework and guidelines to assess the efficiency of fixed income markets in general and provide a comparison of corporate bond markets with Treasury bond markets. In section 4, I describe the structural problems that contribute to the lack of liquidity and inefficiency of section 144a high yield bond issues. Section 5 analyzes the data on the Safety-Kleen debt issues.

[2] The United States Treasury market is where debt securities issued by the Treasury of the United States are traded. Agency debt securities are those issued by quasi-government agencies such as Fannie Mae, Freddie Mac, etc. The Treasury bond market serves as a benchmark for the corporate bond market as corporate yields are expressed as a spread over the yields of Treasury debt securities.

2. Qualifications:

I am the Chase Manhattan Bank Professor of Finance and Economics at The Graduate School of Business, Columbia University. I have been a faculty member at Columbia University since 1981, and I am currently the chairman of the finance sub-division. At Columbia University, I teach courses on two subjects: a) Debt Markets and b) Advanced Derivatives. The Debt Markets course covers Treasury markets, agency markets, corporate debt securities [including investment grade, high yield and asset-backed securities], swaps and other derivatives. These courses cover valuation of securities, trading strategies, evaluation of risks associated with derivatives and cash positions. My research over the last 23 years has focused on futures contracts, forward contracts, swaps, options, auctions, default risk, corporate debt valuation, term structure of interest rates, etc. I have developed several valuation models in these areas. I attach my resume [in Appendix 1], which lists the articles that I have written in these areas. I have also authored a book on "Fixed Income Markets and Their Derivatives," which is used in several universities and investment banks for teaching and training purposes. I have testified before the United States Congress on the transparency of corporate debt securities markets in the United States.

In addition to my academic and research experience, I have also worked in the financial services industry. I have worked as a senior strategist at Lehman Brothers in their Derivatives Strategies Group for over a year and have consulted for them for over two years. I worked as a full-time consultant to Morgan Stanley Asset Management Group for one year. During this period I worked on projects relating to the credit risk in corporate debt securities. I am currently a consultant to Chubb group and Morgan Stanley. I am quite familiar with debt markets in general and corporate debt securities in particular. I am also very familiar with derivatives markets, their valuation and their risk properties. Over the last decade, I have trained a number of Wall Street professionals in derivatives pricing and risk management including the Associates and Analysts at Goldman Sachs, Morgan Stanley, CSFB, etc.

In the preparation of this report, I have extensively relied on my knowledge and experience that I have earned over the last two decades through research, teaching, consultancy and work experience in the areas of corporate bond valuation, credit risk analysis, bond auctions, pricing credit risky securities, derivatives and risk management. I also list the documents that I have relied on in the preparation of this report in Appendix 7.

My hourly rate for this assignment is $625 plus travel and any out-of-pocket expenses. The research staff at Charles River Associates has provided research assistance to me in this matter. To the extent any additional facts and documents may become available in the future, I reserve my right to modify my conclusions accordingly.

3. Efficiency of Bond Markets

How does information get incorporated into market prices?

In an efficient market, the prices of securities promptly reflect all publicly available information. In order that security prices may fully reflect public information, it should be possible for investors to buy, sell or short securities freely. Investors who have positive information about a bond would like to buy it outright if they have capital. Bullish [optimistic] investors who lack capital would like to buy the bond by pledging it as collateral in the market for repurchase agreements to finance their purchases[3]. Such actions by bullish investors will drive the prices of securities up. In this sense, actions of bullish investors reflect their information sets into market prices.

Likewise, investors who believe that a particular debt issue is overvalued relative to its true worth may sell it if they own it. Bearish [pessimistic] investors with similar sentiments would like to short the bond in markets for repurchase agreements or buy protection in single name Credit Default Swap Markets[4]. Such actions by investors will drive the prices of bonds down. In this sense, actions of bearish investors reflect their information sets into market prices.

In order for investors who lack capital to own the bond or for investors to sell a bond that they do not own, it is necessary that a market for repurchase [repo] agreements exist in the debt securities markets. In a repo market an investor is able to go long in a bond by pledging the bond as collateral and borrow cash to pay for it. Likewise, an investor is able to short the bond and place cash proceeds as collateral to reflect bearish views and information sets into the market price of the bond. It should be emphasized that major financial institutions and dealers are often heavily leveraged. Their capital is scarce. In order for them to manifest their information sets and their market opinions they need to be able to finance their long positions and be able to short securities. By any means these institutions at the margin are key players whose actions influence market prices. The reported leverage of financial institutions is rather large. I quote below the relevant figures from Treasury under-secretary, Gary Gensler:[5]

> "[P]er dollar of capital, large banks have about \$11.50 of debt, thrifts have \$12.50 in debt, and the five largest securities firms have approximately \$25 in debt."

[3] Markets for Repurchase agreements are known as repo markets. In these markets, dealers and financial institutions can borrow money to buy securities which they post as collateral. Likewise, they can short securities and post cash as collateral.

[4] Single Name Credit default swap markets permit institutions to buy or sell protection on credit risky instruments such as corporate bonds. The buyer of protection will pay a periodic premium and the seller will pay the difference between the par value and the market value of the security when there is default within the term of the swap.

[5] Testimony of Gary Gensler to House Banking sub-committee on capital markets, securities and Government Sponsored Enterprises, March 22, 2000.

Therefore, the availability of such market institutions as markets for repurchase agreements and Single Name Credit Default swaps [CDS, henceforth], promotes the informational efficiency of prices in the bond markets. For example, Treasury debt securities and agency debt securities have active repo markets where investors can go long or short in these debt securities with minimal capital commitment. The availability of these repo markets then permits the transmission of an information set possessed by these investors into the prices of Treasury and agency debt securities.

With few exceptions, the availability of repo markets in corporate debt securities markets is rather limited. This deficiency is particularly severe for high yield debt securities markets. This implies that investors who have varying information sets and opinions about high yield bond markets may not be able to translate them into investment actions unless they actually own the bonds [which they can sell] or have capital [in which case they can buy]. Otherwise, such investor information sets will not be reflected in bond prices. This could lead to an informationally inefficient bond market.

Beginning in the mid 90s, credit derivatives markets have been developing for investment grade corporate debt. It is now possible to buy or sell protection on about 200 named issues of investment grade debt securities in the CDS markets. Since repo markets are limited in corporate bond markets, the availability of CDS markets [for investment grade debt] has enabled investors [with limited capital] to reflect their information into investment grade corporate debt markets more rapidly. An investor who is bearish about a bond [say, XYZ] can buy a five year protection on the XYZ bond by buying a CDS which requires the payment of a swap premium in installments for a period which is the minimum of five years [term of the swap] or the time when a specified credit event [restructuring, chapter 11 filing, etc.] takes place for the XYZ bond. The premium is a small fraction of the actual position of the corporate bond on which the protection is purchased. If a credit event were to occur within the next five years, the buyer of CDS will receive the difference between the par value of the bond position and the price at which the bond can be purchased in the market following the credit event. In effect, the investor has taken a short position in the XYZ corporate bond.

By analogous reasoning, an investor can take a long position in a named bond without a major capital commitment by selling protection in the CDS market.

Thus, the CDS market has provided an institutional framework to short the bond and go long in the bond. The premium paid for a CDS reflects a) the probability of default and b) the recovery upon default. The presence of CDS prices therefore improved the possibility of inferring additional information about the determinants of bond prices.

High yield debt securities are traded in dealer markets, which are highly decentralized. As will be discussed later in the report, this characteristic coupled with other features of the high yield debt markets makes them less efficient.

The absence of an active repo market as well as an active CDS market in high yield debt securities markets represents a structural impediment to the informational efficiency of high yield bond markets.

Empirical Dimensions of Market Efficiency

The extent of the informational efficiency of Treasury, Agency and high yield bond markets is reflected by a number of important empirical dimensions of the bond market.

- ***Live Prices Versus Indications:*** Whether the prices that are quoted on the electronic screens or by the brokers are just indications by the market makers [so that the actual transaction prices have to be negotiated later] or they are actually transaction prices at which the bid can be "hit" and the offer "taken." If the bids and offers are "live" rather than indications, then the market is more efficient, holding other relevant factors constant.
- ***Proportion of Supply Traded & Frequency of Trading:*** What fraction of the securities outstanding are actually traded in the markets? The greater this fraction, the greater the availability of information to investors about the true value of the security.
- ***Bid-Offer Spreads and Transactions Costs:*** What is the bid-offer spread and what are the transaction costs associated with the security markets? The greater the bid-offer spread, the lower the market efficiency, holding other factors fixed. Likewise, the greater the transaction costs, the lower the market efficiency.
- ***Degree of Fragmentation:*** Are the securities relatively homogeneous? Or, are the securities rather heterogeneous due to their idiosyncratic contractual features and high exposure to default risk? Markets in which securities are homogeneous tend to be more efficient, holding other factors fixed.

a) Live prices versus Indications:

When market makers post live bids and offers at which transactions can be done, then such quotes represent the market maker's best valuations at which they are willing to trade. If active trades take place at such posted prices, then it is a confirmation that investors [counter-parties on the other side of the market makers] are confident in the valuations of market makers so that they are willing to transact at the posted prices. These two conditions together imply that no further negotiations are necessary for the transaction to take place. In this sense, the market is efficient as both the buyer and the seller are willing to transact without any further negotiation. If, in addition, the posted bid-offer spreads are small, then it is a clear confirmation that the buyer and the seller share almost common valuations: the cost of reversing investment decisions

[to buy or to sell] is minimal and the market is efficient. Corporate bond markets rarely satisfy all these conditions. The only bond market that satisfies all these conditions is the Treasury bill, notes and bond markets. I provide below some evidence, which will support my claim.

For Treasury markets, a number of trading platforms and inter-dealer brokers provide live quotes. In Appendix 3 to this report, I have provided extant empirical evidence on properties of Treasury bond markets. These data are taken from a research paper published by Michael J. Fleming from the Federal Reserve Bank of New York.[6] The sample period for this study covered December 30, 1996 to March 31, 2000. Table 1 shows the inter-dealer trading volume in key benchmarks. The mean and median sizes of transactions run in many hundreds of million dollars. Table 2 indicates the number of trades per day. Note that the mean number of trades range from 56 to nearly 700 trades per day. The mean bid-offer spreads for money market securities, in Table 3, is less than a basis point and for medium and long-term securities the bid-offer spread is between 0.21 to 0.78 of 32nds. These are very narrow bid-offer spreads indicating a very liquid and [when combined with the large trading volume] efficient market. The depth of the market is indicated in Table 4. Mean quote sizes range from about 8 million [for 10-year T-note] to nearly 25 million [for 2-year T-note].

As yet another benchmark, one can examine agency debt securities markets. A recent study reports that the cheapest bid-offer spreads on Trade Web for agency benchmark notes was in the range of 0.25 to 0.50 basis points.[7] When an underlying bond market achieves a threshold level of liquidity, futures and options markets develop on the underlying bond. This feature can be readily seen in the Treasury securities markets and in the agency securities markets. As shown in Appendix 4, Chicago Board of Trade has listed active futures contracts on all Treasury benchmark securities as well as on major agency benchmark debt securities. Despite a few attempts similar developments have not been made in the corporate bond market due to lack of liquidity and established benchmarks.

In sharp contrast to Treasury bills, notes and bond markets or agency securities markets, corporate bond markets have historically suffered from lack of price transparency and lack of liquidity. Astute students of markets have long recognized this problematic dimension of corporate debt securities markets in the Unites States. Arthur Levitt [during his tenure as the chairman of SEC] said the following of corporate debt markets:

> "The Securities Exchange Commission staff conducted a review of the market for debt securities in the United States, with particular emphasis on the state of price transparency.

[6] "Measuring Treasury Market Liquidity," by Michael J. Fleming, Federal Reserve Bank of New York, June 2001.

[7] Funding Notes, May 2002, Volume 7, Issue 5.

> The Commission staff's review found that, as a whole, the market for government securities is characterized by high-quality pricing information for investors. The review also cited significant improvement over the last few years in the transparency of the municipal securities market. However, in the area of corporate bonds, the Commission staff found that price transparency is deficient."[8]

> "The sad truth is that investors in the corporate-bond market do not enjoy the same access to information as a car buyer or a home buyer or, I dare say, a fruit buyer. Improving the transparency is a top priority for us."[9]

Additional comments from the SEC note the same deficiency:

> "Timely and accurate pricing information on the broad spectrum of corporate bonds is not available to the public or even to market participants. Some corporate bonds are traded by interdealer brokers, but transaction prices, even for interdealer transactions are not displayed or reported in an organized way. As a result, in order to obtain accurate valuations of corporate debt instruments, corporate bond market participants must have a trading desk and a research department with sophisticated analytical tools to gather and interpret market information. Generally these kinds of resources are available only to large broker-dealers and institutional investors."[10]

> "Two investors buying the same bond at the same time from the same dealer can be given very different prices -- prices differing by as much as 6% -- a full year's worth of interest."[11]

As recently as January 2001, the Securities and Exchange Commission approved rules that required securities dealers to report all trades in corporate bonds to the National Association of Securities Dealers [NASD] and also approved rules that made certain transaction reports available for public dissemination. It was only on July 1, 2002 that NASD first began disseminating price information for 500 of the largest corporate debt issues, marking the first time that actual execution prices for corporate bonds were available to a broad set of participants.[12] It is therefore

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[8] Prepared Statement of Hon. Arthur Levitt, Chairman, Securities and Exchange Commission. Improving Price Competition for Mutual Funds and Bonds Hearing before the Subcommittee on Finance and Hazardous Materials of the Committee on Commerce House of Representatives, September 29, 1998.
[9] "In the Dark: The Pricing of Bonds, Long a Big Mystery, Gets Some Scrutiny -- Buyers Now Can't Find out the Markup; SEC Chief Vows to Make Changes -- Hard to Comparison-Shop" by Gregory Zuckerman, Wall Street Journal, September 10, 1998, A1.
[10] Statement of the U.S. Securities and Exchange Commissioner Concerning Transparency in the United States Corporate Debt Market To the Subcommittee on Securities Committee on Banking, Housing and Urban Affairs, United States Senate, May 26, 1999.
[11] Tom Woodruff, "Capital Connection: SEC prodded to lift veil on corporate bond trading" quoting Commerce Committee Chairman Tom Bliley, R-Va.
[12] "Price Transparency in the Corporate Bond Market: A World of Change is Ahead," Wall Street & Technology Online, March 12, 2003.

reasonable to assume that even this basic level of information was not available to corporate bond investors prior to 2002.[13]

b) Proportion of Supply Traded & Frequency of Trading:

The daily total trading volume in 2002 in the Treasury market averaged $360 billion, which represented about 12% of the total outstanding supply of $3.1 trillion.[14] This trading volume implies an efficient market as the prices reflect actual transactions that thrive in this market.

The average trading volume for agency debt securities is shown in Appendix 5. Note that the average trading volume in this market as of 2002 was $81,753 million. The Bond Market Association reports a $2.4 trillion size for this market. The new issue trading volume is estimated at $344.6 billion and the average daily trading volume is estimated at $86.8 billion.[15] The proportion traded varies from about 3.5% to about 12% for new issues and all issues respectively.

In sharp contrast, the average trading volume in the corporate bond market was estimated at $20 billion per day. The total outstanding supply of corporate bonds is in the neighborhood of $4 trillion. In other words, only 0.5% to 1% of the outstanding supply actually turns over in a given day.[16] Secondary market trading is very important as investors can infer the value of securities by looking at the prices of transactions [buy and sell] in the secondary markets. The greater the volume of trading in the secondary markets, the greater is the pricing efficiency.

The analysis of high yield bond data shows that high yield bonds are infrequently traded. This is in sharp contrast to the evidence that we have reported for Treasury securities in Appendix 3, Table 2.

c) Bid-Offer Spreads and Transactions Costs:

Data on bid-offer spreads and transactions costs are very difficult to get for corporate bonds in general and section 144a issues in particular. Recent empirical work has looked at the corporate debt securities markets with the objective of assessing their liquidity. They do this by estimating bid-offer spreads, price impact and transactions costs. However, these studies have limited relevance for assessing the efficiency of Safety-Kleen note issues since their analysis is usually based only on the most

[13] In April 1994, the NASD implemented the Fixed Income Pricing System ("FIPS") to collect transaction and quotation information on non-investment grade domestic registered, non-convertible issues. Securities eligible for FIPS consisted of 50 "mandatory" issues and approximately 1350 "non-mandatory" issues. Mandatory issues were selected by a committee of NASD members from the most actively traded FIPS securities. FIPS did not publicly disseminate data for non-mandatory issues.

[14] Wall Street and Technology online, March 12, 2003.

[15] Debt markets represented by the Bond Market Association as of 2003, quarter 1.

[16] This paragraph is extracted from "Price Transparency in the Corporate Bond Market: A World of Change is Ahead," Wall Street & Technology Online, March 12, 2003.

actively traded corporate bonds and often exclude 144a issues. In particular, their datasets typically exclude days in which a bond does not have both a buy and a sell transaction. For the notes issued by Safety-Kleen, such days are rather common.

Data on 98 high yield bonds were collected from Interactive Data Corporation [IDC][17]. IDC reports quotes in some cases and estimated prices in situations where they do not have access to reliable quotes.[18] Using a sample of high yield issues for which both bid and ask prices were available, the bid-offer spread was estimated for each issue. The bid-offer average spread varied from a low of 0.2993 to a high of 18.3304. To put this in perspective, we can express them in units of 32nds or tics, which is the standard in Treasury debt securities that pay coupons. The minimum bid-offer spread for the 98 high yield bonds is 9.6 tics, the maximum is 586.6 tics, the average is 82.6 tics and the median is 58.2 tics. This is in sharp contrast to Treasury coupon securities and agency coupons where the bid-offer spread is a fraction of a tic or at most, a tic or two.

Put differently, even the minimum bid-offer spread in this sample is more than ten times the average bid-offer spread in the Treasury markets.

d) Degree of Fragmentation:

Unlike Treasury or agency debt securities which are relatively homogeneous and are issued in fairly large amounts, corporate bonds in general and high yield bonds in particular are highly fragmented due to the following reasons:

- ***High yield bonds are generally issued in small sizes.*** A recent study has reported that the average size of a high yield bond issue in public registered markets in 1998 was about $80 million. [In 1990, the corresponding size was about $150 million]. The average size for a section 144a issue in 1998 was about $100 million. [In 1990, the average size was a bit over $120 million. [19]] In contrast, Treasury securities are issued in the $10-$25 billion range and agency securities are issued in the $2-$5 billion range. Auction sizes for Treasury and agency securities runs into billions of dollars. I have provided in Appendix 6 statistics from some recent auctions. This difference in supply is significant and contributes towards greater liquidity and efficiency of Treasury and agency markets relative to the corporate high yield market.

[17] The bonds selected were those bond issues listed in the Merrill Lynch High Yield Master II Index as of 5/17/99 for which both bid and ask prices were available in the IDC database. Average daily bid-ask spreads were calculated over the period from May 21, 1998 through March 3, 2000.

[18] The Citigroup Yield Book, formerly the Salomon Brothers Yield Book, a widely used source for bond prices, and bond analytics did not have data for these issues.

[19] "The Impact of Rule 144a Debt Offerings Upon Bond Yields and Underwriter Fees," Miles Livingston, University of Florida and Lei Zhou, Miami University of Ohio, Financial Management, Winter 2002, pages 5-27.

- ***High yield bonds vary significantly in their credit exposure.*** The composition of high yield debt varies significantly in terms of credit ratings, which is a measure of the credit worthiness of issuers. This means that within a rating class, institutional investors [who are subject to some constraints on diversification which preclude them from holding any particular issue in large amounts relative to their total supply] typically have a fairly small number of less liquid issues to choose from.

- ***High yield bonds vary significantly in their contractual features.*** Some high yield issues are non-callable. Many issues are callable at the discretion of issuers. The terms of the embedded call options varies from one issuer to another. Some bonds have pay-in-kind features. The result of these rich cross-sectional variations in contractual arrangement is that the market is not homogeneous as is the case with Treasury securities markets. This contributes to a further fragmentation of the high yield bond market.

Together, these factors coupled with the fact that the market is a dealer market implies less of an efficiency compared to Treasury or agency markets. The factors discussed above renders corporate securities extremely heterogeneous, while, in contrast, Treasury securities are fairly homogeneous. This difference contributes to poorer efficiency and higher search costs.

4. Structural Problems of Section 144a Issues:

- Section 144a issues are subject to less stringent disclosure and reporting requirements than registered issues. This implies that at the time of their issue, investors have less information about section 144a issues as compared to fully registered issues.
- In addition, section 144a issues are traded only between qualified institutional buyers or QIBs. Qualified Institutional Buyers are institutions that manage at least $100 million in securities (banks, S&Ls, insurance companies, investment companies, employee benefit plans, or entities owned entirely by qualified investors). QIBs also include registered broker-dealers owning and investing $10 million in securities of non-affiliates. This implies less liquidity in the secondary market for these bonds.
- In addition, recent empirical work has provided evidence that insurance companies prefer investment grade section 144a issues as opposed to high yield bonds issued under section 144a rule.[20] This preference is shown to make high yield bonds less liquid.

[20] "The Impact of Rule 144a Debt Offerings Upon Bond Yields and Underwriter Fees," by Miles Livingston, University of Florida and Lei Zhou, Miami University of Ohio, Financial Management, Winter 2002, pages 5-27.

5. Safety-Kleen Debt Issues & Their Liquidity Measures

Safety-Kleen issued two different non-convertible senior notes for a total of $550 million over the class period from April 17, 1998 through March 9, 2000. Each of the bonds was initially assigned non-investment grade ratings from Moody's and S&P. The table below provides summary characteristics of the these bonds:

Safety-Kleen 2008 and 2009 Notes[21]

	2008 Notes	2009 Notes
Issue Amount	$325 Million	$225 Million
Coupon	9.25%	9.25%
Maturity	6/1/2008	5/15/2009
Initial 144A Offering Date	5/21/1998	5/10/1999
Registration Date	10/23/1998	8/10/1999

There do not appear to be any publicly available sources of price or quote data for the Safety-Kleen bonds. IDC provides daily evaluated prices for Safety-Kleen issues based on the market prices of all bonds in the market and evaluation models and analytical tools. These prices do not necessarily reflect actual trades or quotes for the Safety-Kleen debt securities. Actual trading data for Safety-Kleen were obtained using trading records provided by plaintiffs and other documents produced in this litigation.[22]

I present below the trading frequency of the two debt issues so as to make a comparative analysis with the daily frequency in Treasury markets[23].

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[21] 2008 Notes – All information is from the May 21, 1998 LES Offering Memorandum, $325,000,000 91/4% Senior Subordinated Notes due 2008, with the exception of the Registration Date, which is from Safety-Kleen Form S-4/A, 2008 Notes Registration Statement, 10/23/98. 2009 Notes – All information is from the May 10, 1999 Safety-Kleen Corp. Offering Memorandum, $225,000,000 91/4% Senior Notes Due 2009, with the exception of the Registration Date, which is from Safety-Kleen Form S-4A, 2009 Notes Registration Statement, 8/10/99.

[22] Plaintiff trading records show that 8 plaintiffs held between 59 and 65% of the total 2009 Note outstanding over the trading period and 9 plaintiffs held between 57 and 83% of the 2008 Note outstanding over the trading period.

[23] The analysis that follows has been revised from my original report dated September 2, 2003 to reflect the additional data included in the reports and/or produced in connection with the depositions of Professor Michael J. Barclay and Professor Michael R. Gibbons in this matter. Of the 1222 observations received from TD Securities as part of Professor Gibbons' report, only 102 observations were included in this report for the following reasons: a) Many of the observations had previously been produced by TD Securities and already recorded in Appendix 7, no. 14 of my original report, b) Many observations represented cancelled trades or trades that occurred outside the class period, and c) numerous trades had been already reported by Plaintiffs and therefore were already included in the original report.

2008 Notes: Trading Frequency

Number of Trades	Days Number of Trades Occurred	% of Total Trading Days
0	355	79.06%
1	30	6.68%
2	16	3.56%
3	7	1.56%
4	6	1.34%
5+	35	7.80%

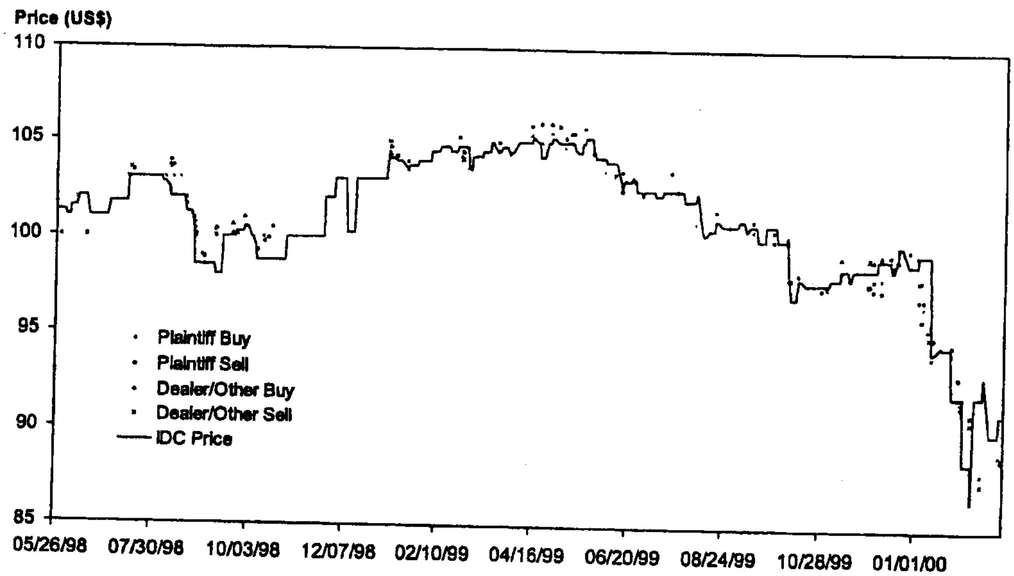
2009 Notes: Trading Frequency

Number of Trades	Days Number of Trades Occurred	% of Total Trading Days
0	154	75.12%
1	18	8.78%
2	8	3.90%
3	6	2.93%
4	2	0.98%
5+	17	8.29%

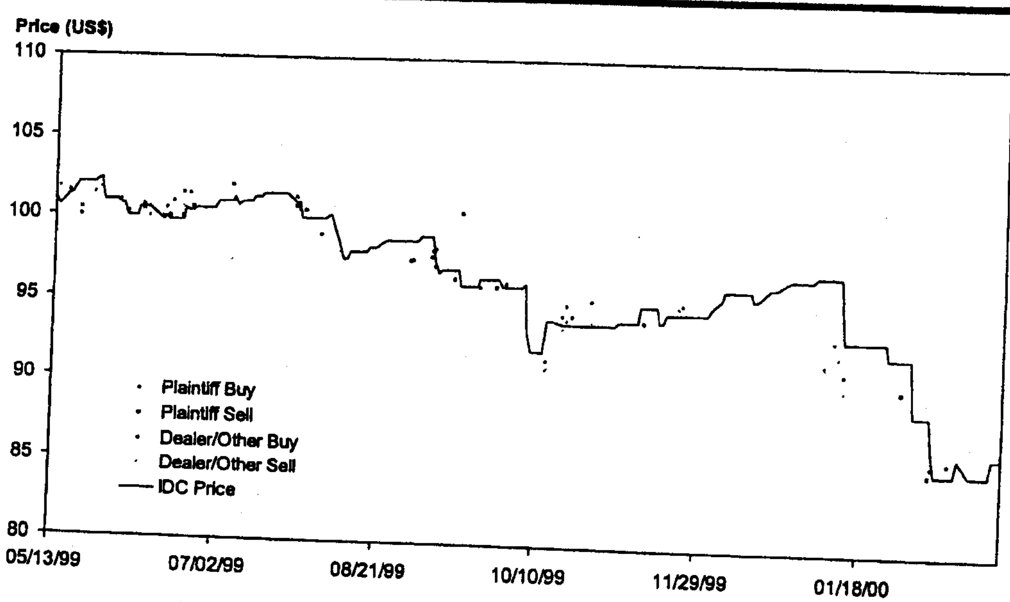
Note that the 2008 Notes were not traded in the secondary markets on 79.06% of the total possible trading days, while similarly, the 2009 Notes were not traded on 75.12% of the total trading days in the class period. In almost 90% of the days, there were fewer than 3 trades. This is in stark contrast to the frequency of trades reported for the Treasury markets in Appendix 3 of this report. This evidence suggests that the secondary market for these debt issues was practically non-existent for much of the class period. For the 2008 bonds the percentage of days during which 5 or more trades took place is 7.80% and for the 2009 bonds the corresponding number is 8.29%.

The bonds were rarely traded. This implies that the prices that market makers quote are at best a rough indication of their true value which fluctuates on a daily basis due to the fact that the probability of default and the loss conditional on default change due to both company-specific and macro economic factors. The dataset from IDC that was cited earlier indicates that the high yield bond market had a significant bid-offer spread which reflects a great deal of uncertainty about the true value of the security. Often quotes will not move, as market makers do not execute any transactions. This implies that the quotes are often "stale". To examine this issue, it is useful to examine the following figures.

Daily Aggregate Data for 2008 Notes: *Price*



Daily Aggregate Data for 2009 Notes: *Price*



Notes & Sources: All non-IDC prices reflect average buy or sell prices on that trading day. IDC, Plaintiff and Other trading data.

Note that the IDC price [bid] data show several "horizontal lines" which is very symptomatic of an illiquid market where the quotes do not change for significant periods of time. This infrequent trading of debt issues can also be understood in the following perspective.

The total number of buys and sells and the total trading volume for these two debt issues are shown below.

Statistic	2008 debt issue	2009 debt issue
Number of Buy Trades	324	127
Dollar volume of Buy Trades (in millions $)	192	57
Number of Sell Trades	197	125
Dollar volume of Sell Trades (in millions $)	208	85

Source: Plaintiff and Other trading data.

The total buy trading volume for 2008 debt issue in the entire sample period was $192 million and the total sell trading volume was $208 million. The issue size for this debt security was $325 million. *Put differently the total dollar volume of buys and sells over the 1998-2000 period were 59% to 64% of the original supply.* The total buy trading volume for 2009 debt issue in the entire sample period was $57 million and the total sell trading volume was $85 million. The issue size for this debt security was $225 million. *In other words, the total dollar volume of buys and sells over the 1998-2000 period were 25% to 37% of the original supply.*

The figures above also suggest that the prices in the dealer database appear to differ from the IDC data. The Safety-Kleen bid-offer spreads were estimated for these debt issues using data on days when there were 2 or more trades. Only 47 trade observations could be detected satisfying this criterion for the 2008 issue and only 19 trade observations for the 2009 issue. On the basis of these data, the following estimates were obtained.

2008 Bonds: Average-Weighted Bid-Ask Spreads

	Observations	Mean Spread	Median Spread	Minimum Spread	Maximum Spread
All Records	47	0.382	0.435	-0.973	2.000
Zero Spread Records Deleted	42	0.427	0.484	-0.973	2.000

2009 Bonds: Average-Weighted Bid-Ask Spreads

	Observations	Mean Spread	Median Spread	Minimum Spread	Maximum Spread
All Records	19	0.483	0.500	-0.425	1.250
Zero Spread Records Deleted	18	0.510	0.500	-0.425	1.250

Source: Plaintiff and Other trading data.
Note: The Average Weighted Bid-Ask Spread is defined as the difference between the average weighted price the investors purchase at and the average weighted price the investors sell at on any single trading day. Weights equal the par value bought or sold.

A comparison of these estimates with the Treasury data confirms the extreme lack of liquidity in these debt issues.

6. Conclusion

I have presented data from Treasury, agency and high yield bond markets that suggest that the Treasury and agency markets are closer to the notion of efficient markets. The absence of market institutions such as the repo markets, and the credit default swaps markets in the high yield bond area results in some structural deficiencies that hinder their efficiency. High yield bond markets are still quote driven and these quotes can be stale and the bid-offer spreads can be wide. The empirical dimensions of liquidity indicate that the high yield bond markets in general are comparatively less efficient than Treasury or agency debt markets. Data specific to the Safety-Kleen debt issues confirm that these bonds are rarely traded, they have very wide bid-offer spreads, and the quotes are stale. Therefore, in my opinion, the Safety-Kleen Notes were not traded in an efficient market.

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Appendix 1

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PROFESSIONAL OBJECTIVES: To pursue a career in research, teaching and consultancy in Capital Markets, Financial Economics, Investment Management, Corporate Finance and Economics.

ACADEMIC BACKGROUND:

PhD in Industrial Administration from the Graduate School of Industrial Administration, Carnegie-Mellon University (1980).
Major Area: Finance
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M.S. in Finance from the Graduate School of Industrial Administration, Carnegie-Mellon University, May 1978.
Post Graduate Diploma in Business Administration, from the Indian Institute of Management, Calcutta, India, May 1973.

B.E. (Honors) in Mechanical Engineering from the University of Madras, India, May 1971.

PROFESSIONAL: AFFILIATION:

Chairman: Finance Division
Chase Manhattan Bank Foundation Professor of Financial Institutions: Since March 1995

Professor (tenured) June 1987 - February 1995

Senior Strategist: Lehman Brothers (1987-1988) on sabbatical leave from Columbia University.
Worked in Fixed-income Research and Derivative Products.

Associate Professor (tenured) April 1986 - May 1987

Associate Professor of Business, July 1983 - March 1986 Graduate School of Business, Columbia University.

Visiting Associate Professor of Finance, September 1984 - December 1984, at the Graduate School of Business, University of Chicago.

Assistant Professor of Business, July 1980 - June 1983, Graduate School of Business, Columbia University.

WORK EXPERIENCE:

Executive Assistant (in the Management Trainee Program) to Deputy General Manager at Tata Engineering and Locomotive Company (TELCO). Responsible for Material Management and Operations Research Applications 1973-1975.
Faculty Member at the Administrative Staff College of India (ASCI), Hyderabad. Program Director for courses on Inventory Management and Spare Parts Management. Co-author of "Materials Management", Prentice-Hall 1975-1976.

PUBLICATIONS:

(1) "A Continuous Time Equilibrium Model of Forward Prices and Futures Prices in a Multi-good Economy, (with Scott Richard) in Journal of Financial Economics, December 1981, Vol. 9, pp. 347-371.

(2) "Constant Absolute Risk Aversion Preferences and Constant Equilibrium Interest Rates," in The Journal of Finance, March 1983, Vol. 37, No. 1, pp. 205-212.

(3) "The Relation between Spot and Futures Prices in Stock Index Futures Markets: Some Preliminary Evidence," (with David Modest) in The Journal of

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BOOKS:

"Fixed-Income Markets and Their Derivatives" by South-Western Publishing Company, Third Edition to be released, (2003)

BOOK REVIEW:

Continuous-time Finance, by Robert C. Merton, Basil Blackwell, (1990), in Review of Financial Studies, 1991, pp 793-803.

WORKING PAPERS:

(1) "Valuing Collateralized Swaps," with Michael Johannes, (2003).

(2) "A Model of Sovereign Borrowing and Sovereign Yields Spreads," [with Rajna Gibson], 2002.

WORK IN PROGRESS:

(1) "Distinguishing Illiquidity from Insolvency," [With Mark Broadie and Mikhail Chernov].

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(3) "Jump to Default Risk in Equity Prices [with Sanjiv Das and Raghu Sundaram]

TEACHING EXPERIENCE:

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(5) Advanced Derivatives

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(1) Survey of Research in Finance
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PROFESSIONAL ACTIVITIES:

Associate Editor for *the Journal of Finance*.

Associate Editor for *Management Science*, (1981-1987).

Associate Editor for _Review of Financial Studies_ (1988-1990).

Associate Editor for _Journal of Financial and Quantitative Analysis_. (1988-1992).

Associate Editor for _Journal of Futures Markets_ (1981-1984).

Refereed papers for Econometrica, Journal of Economic Theory, Journal of Finance, Journal of Financial Economics, Journal of Political Economy, Management Science, Journal of Futures Markets, Journal of Financial and Quantitative Analysis, Journal of Money, Credit and Banking, The Journal of International Money and Finance, Journal of Business European Economic Review and Journal of Banking and Finance, and Review of Financial Studies.

CONSULTING EXPERIENCE:

1. Testified before the Subcommittee on Finance and Hazardous Materials of the Committee on Commerce House of Representatives on the "Transparency of the Corporate Bond Markets," September 29, 1998.

2. Pricing Equity Notes for an investment banking firm; Pricing debt options for a government securities firm and designing hedging programs for portfolios of fixed income securities.

3. Consultant to Shearson Lehman Hutton, in the area of fixed income securities research, options and futures (1986-1989).

4. In-house Management Training Program for American Express, Goldman Sachs, Credit Suisse, First Boston, Kidder Peabody, Societe-Generale and Lehman Brothers.

5. Expert Witness for Securities and Exchange Commission, (1989-1990).

6. Expert Witness for Internal Revenue Service in matters relating to Derivative Securities valuation. (1995-1999).

7. Coordinator for World Bank Program in Asset Liability Management for Developing Countries.

8. UNDP consultant to Management Schools in India.

9. Consultant to Lehman Brothers on Risk Management (1994).

10. Visiting Scholar at International Monetary Fund .

11. Consultant to World Bank.
12. Consultant to Morgan Stanley Asset Management since July 2000.
13. Consultant to Ernst and Young since July 1998.
14. Member of the Treasury Borrowing Advisory Committee, USA.

Appendix 2

Trial and Deposition Testimony

In re Ashanti Goldfields, Eastern District of New York. 7/14/03

Appendix 3

Source: Extracted from Michael J. Fleming, "Measuring Treasury Market Liquidity," Federal Reserve Bank of New York, June 2001.

Table 1: Daily Inter-dealer Trading Volume of U.S. Treasury Securities [billions of dollars]

Issue	Mean	Median	Standard Deviation	Minimum	Maximum
3-month bill	1.28	1.18	0.70	0.00	4.48
6-month bill	0.84	0.76	0.51	0.05	5.27
1-year bill	2.01	1.82	0.99	0.02	5.61
2-year note	6.65	6.43	2.48	0.86	18.03
5-year note	5.63	5.51	2.42	0.27	14.48
10-year note	3.81	3.77	1.60	0.19	9.14

Table 2: Daily Trading Frequency of U.S. Treasury Securities [# of trades per day]

Issue	Mean	Median	Standard Deviation	Minimum	Maximum
3-month bill	56.2	53	26.2	0	164
6-month bill	41.4	39	19.8	2	116
1-year bill	107.7	98	48.9	3	273
2-year note	467.2	460	158.0	72	1043
5-year note	693.1	697	273.8	47	1632
10-year note	593.3	603.5	209.6	45	1247

Table 3: Bid-Offer Spreads of U.S. Treasury Securities [bp means basis points.]

Issue	Mean	Median	Standard Deviation	Minimum	Maximum
3-month bill	0.71 bp	0.61 bp	0.45 bp	0.13 bp	5.64 bp
6-month bill	0.74 bp	0.66 bp	0.34 bp	0.27 bp	3.16 bp
1-year bill	0.52 bp	0.48 bp	0.25 bp	0.15 bp	3.12 bp
2-year note	0.21 32nds	0.20 32nds	0.04 32nds	0.13 32nds	0.46 32nds
5-year note	0.40 32nds	0.36 32nds	0.14 32nds	0.20 32nds	1.18 32nds
10-year note	0.78 32nds	0.71 32nds	0.25 32nds	0.42 32nds	2.99 32nds

Table 4: Quote Sizes of U.S. Treasury Securities [in millions of dollars.]

Issue	Mean	Median	Standard Deviation	Minimum	Maximum
3-month bill	16.9	14.9	8.6	6.4	120.5
6-month bill	15.5	14.1	6.1	6.0	53.2
1-year bill	17.2	16.4	5.6	6.6	42.0
2-year note	24.5	23.0	8.1	6.6	54.5
5-year note	10.7	10.3	2.8	4.3	23.1
10-year note	7.9	7.7	2.7	2.0	16.2

Appendix 5

Average Daily Trading Volume of
Federal Agency Securities

1991 - 2003

($ Millions)

	Transactions w/ Inter-Dealer Brokers	Transactions w/ Others	Total
1991	1,541.0	4,170.0	5,711.0
1992	1,239.0	4,874.0	6,113.0
1993	1,442.0	7,497.0	8,939.0
1994	1,285.0	14,735.0	16,020.0
1995	738.0	22,958.0	23,696.0
1996	773.0	30,296.0	31,069.0
1997	1,240.0	38,978.0	40,218.0
1998	2,362.0	45,234.0	47,596.0
1999	4,119.0	50,447.0	54,567.0
2000	8,468.0	64,320.0	72,788.0
2001	12,186.0	78,033.0	90,219.0
2002	10,863.0	70,890.0	81,753.0
2003*	9,774.0	76,999.0	86,773.0

*As of March 31, 2003

(1) Average daily trading volume in federal agency securities by primary dealers with inter-dealer brokers and primary dealers

Source: Federal Reserve Bank of New York and Bond Markets Association Website.

Suresh M. Sundaresan

Appendix 6

Source: Treasury website.

Bureau of the Public Debt - Office of Financing
Addendum to Press Release dated August 27, 2003

2-year Treasury Note
CUSIP: 912828BJ8
(amounts in thousands)

Tender Type	Tendered	Accepted
Primary Dealer[1]	34,843,000	17,273,340
Direct Bidder[2]	225,000	225,000
Indirect Bidder[3]	7,236,813	6,664,928
Total Competitive	$ 42,304,813	$ 24,163,268

Notes:
1: Primary dealers as submitters bidding for their own house accounts.
2: Non-Primary dealer submitters bidding for their own house accounts.
3: Customers placing competitive bids through a direct submitter, including foreign and international monetary authorities placing bids through the New York Federal Reserve Bank.

Source: Funding Notes, FNMA, June 2003, Volume 8, issue 5.

Fannie Mae Fixed Rate Bullet Debt

Maturity/Call	May 2003 Par Amount	(# Issues)	2003 Year to Date Par Amount	(#Issues)
2 Years		(0)		(0)
3 Years		(0)	$ 8,000,000,000	(2)
5 Years	$ 4,000,000,000	(1)	$ 10,255,723,000	(4)
7 Year		(0)		(0)
10 Year		(0)	$ 4,000,000,000	(1)
30 Years		(0)	$ 6,020,319	(1)
Total	$ 4,000,000,000	(1)	$ 22,261,743,319	(8)

Fannie Mae Callable Benchmark Notes

Maturity/Call	May 2003 Par Amount	(# Issues)	2003 Year to Date Par Amount	(#Issues)
3NC1		(0)	$ 4,000,000,000	(2)
5NC2	$ 2,000,000,000	(1)	$ 4,000,000,000	(2)
10NC3		(0)	$ 3,000,000,000	(2)
Total	$ 2,000,000,000	(1)	$ 11,000,000,000	(6)

Appendix 7

DOCUMENTS REVIEWED FOR PREPARING THIS REPORT

1. Declaration of James M. Hassett In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 21, 2002 and April 2, 2003.
2. Declaration of Mohan V. Phansalkar In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 21, 2002 and April 7, 2003. PIMCO 1092-PIMCO 1131.
3. Declaration of James P. Shanahan, Jr. In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 25, 2002 and April 8, 2003. PACH0001-PACH0006.
4. Declaration of David C. Barclay In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 21, 2002 and April 3, 2003.
5. Declaration of Francis J. McNamara, III In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 20, 2002.
6. Declaration of George H. Crane In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, April 7, 2003.
7. Declaration of Michael Bevacqua In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 25, 2002 and April 1, 2003.
8. Declaration of Richard Kuersteiner In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 22, 2002. FRANKL0990-FRANKL0997.
9. Declaration of Timothy J. Andrews In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 19, 2002 and April 4, 2003. OCM00078-OCM00134.
10. Declaration of William H. Bohsack, Jr. In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 19, 2002 and April 1, 2003.
11. Declaration of Ilene S. Harker In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 22, 2002 and April 2, 2003. WAMCO 00001-WAMCO 00018.
12. Declaration of Peter C. Kelly In Re Safety Kleen Corp. Bondholders Litigation, Consol. Case No: 3-00-1145 17, November 21, 2002 and April 7, 2003.
13. Bond Trading data from NationsBanc Montgomery Securities, LLC., Bates numbered NBM000974 through NBM 00983.
14. Bond Trading data from TD Securities, Bates numbered TD 0021749 through TD 0021763; trade records produced by Professor Gibbons on 10/1/03 as td.tradedata.xls and sktrades.1998.xls. "Responses of TD Securities (USA) Inc. to Plaintiffs' Interrogatories Dated September 30, 2003," dated October 6, 2003.

15. Transaction records from American General Life Insurance (Bates numbered MJB 00468 through 509), Baring Asset Management (Bates numbered MJB 00517 through MJB 00574), Pacific Life Insurance (Bates numbered MJB 00511 through MJB 00515), Wasserstein Perella Securities, Miller Tabak Roberts ("MTR," Bates numbered MTR 001 through MTR 002), Deutsche Bank, and additional trading records believed to be Bear Stearns dealer data (Bates numbered MJB 00460 through MJB 00466) produced in response to defendants' subpoena.
16. Testimony of Gary Gensler to House Banking sub-committee on capital markets, securities and Government Sponsored Enterprises, March 22, 2000.
17. "Measuring Treasury Market Liquidity," by Michael J. Fleming, Federal Reserve Bank of New York, June 2001.
18. Funding Notes, May 2002, Volume 7, Issue 5.
19. Prepared Statement of Hon. Arthur Levitt, Chairman, Securities and Exchange Commission. Improving Price Competition for Mutual Funds and Bonds Hearing before the Subcommittee on Finance and Hazardous Materials of the Committee on Commerce House of Representatives, September 29, 1998.
20. Wall Street Journal, September 10th, 1998.
21. Statement of the U.S. Securities and Exchange Commissioner Concerning Transparency in the United States Corporate Debt Market To the Subcommittee on Securities Committee on Banking, Housing and Urban Affairs, United States Senate, May 26, 1999.
22. Tom Woodruff, "Capital Connection: SEC prodded to lift veil on corporate bond trading" quoting Commerce Committee Chairman Tom Bliley, R-Va.
23. "Price Transparency in the Corporate Bond Market: A World of Change is Ahead," Wall Street & Technology Online, March 12, 2003.
24. Bond Market Association as of 2003, quarter 1.
25. "A Comparison of Trading Costs in the U.S. Corporate, Municipal and Treasury Bond Markets," Sugato Chakravarty and Asani Sarkar, November 2001.
26. "An Empirical Study of Bond Market Transactions," Gwangheon Hong and Arthur Warga, Financial Analysts Journal, March/April 2000, pages 32-46.
27. "The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis," Edith S. Hotchkiss and Tavy Ronen, The Review of Financial Studies, Winter 2002, Vol. 15, No. 5, pages 1325-54.
28. "Corporate Bond Trading Costs: A Peek Behind the Curtain," Paul Schultz, Journal of Finance, April 2001, Vol. LVI, No. 2, pages 677-698.
29. Merrill Lynch High Yield Master II Index as of 5/17/99.
30. IDC Database.
31. Solomon Brothers yield book.
32. The Impact of Rule 144a Debt Offerings Upon Bond Yields and Underwriter Fees, by Miles Livingston, University of Florida and Lei Zhou, Miami University of Ohio, Financial Management, Winter 2002, pages 5-27.
33. Michael Fleming: "Measuring Treasury Market Liquidity", Federal Reserve Bank of New York, June 2001.
34. Federal Reserve Bank of New York and Bond Markets Association Website.
35. Treasury website.

36. Funding Notes, FNMA, June 2003, Volume 8, issue 5.
37. Livent, Inc. Noteholders Securities Litigation 211 F.R.D. 219 (S.D.Ny 2002), Lead Plaintiffs' Motion for Class Certification Denied, Filed November 7, 2002.
38. Camden v. Sunbeam Corporation, 2001 U.S. Dist. LEXIS 11022, Arthur Anderson's Motion to Deny Class Certification Granted and Debenture Plaintiff's Cross Motion for Class Certification Denied, Filed July 3, 2001.
39. Expert Report of Michael Barclay dated 7/19/2003.
40. LES Offering Memorandum, May 21, 1998.
41. Safety-Kleen Form S-4/A, 2008 Notes Registration Statement, 10/23/98.
42. Safety-Kleen Corp. Offering Memorandum, May 10, 1999.
43. Safety-Kleen Form S-4A, 2009 Notes Registration Statement, 8/10/99.
44. Deposition of Ramzi Zein, October 2, 2003.
45. Expert Report of Ramzi Zein, Ph.D., dated August 29, 2003.
46. Report by Professor Michael R. Gibbons dated September 2, 2003.
47. Report by Professor Michael R. Gibbons dated September 29, 2003.
48. Deposition of Michael R. Gibbons, October 1, 2003.
49. Deposition of Michael Barclay, September 11 –12, 2003.

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing document were served upon the following on June 30, 2004, in the manner specified:

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